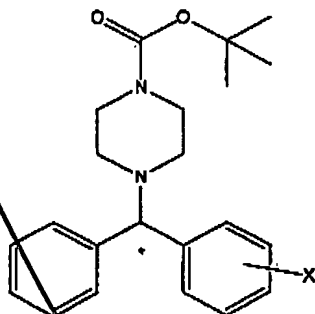


WHAT IS CLAIMED IS:

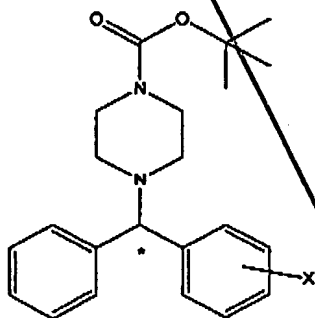
1. An optically active 4-(tert-butoxycarbonyl)piperazine compound of formula (1'):



(1')

wherein X denotes a chlorine atom, a C1-C3 alkyl group or a C1-C3 alkoxy group and * designate an asymmetric carbon atom.

2. A composition comprising
an optical isomer of formula (1''):



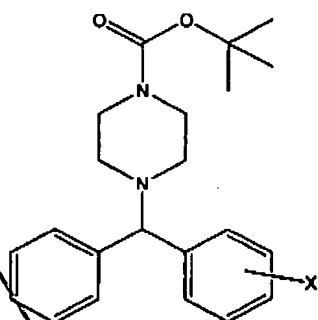
(1'')

wherein X denotes a chlorine atom, a C1-C3 alkyl group or a C1-C3 alkoxy group and * designate an asymmetric carbon atom, and
an enantiomer thereof, in an optional ratio.

3. A 4-(tert-butoxycarbonyl)piperazine compound of formula (1):

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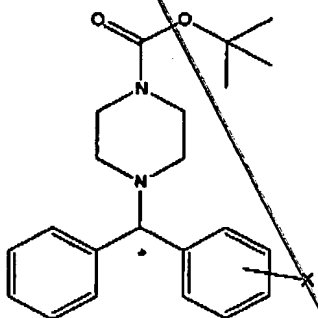


(1)

wherein X denotes a chlorine atom, a C1-C3 alkyl group or a C1-C3 alkoxy group.

4. An optical isomer of formula (1''):

5

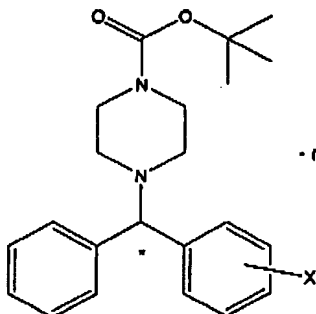


(1'')

wherein X denotes a chlorine atom, a C1-C3 alkyl group or a C1-C3 alkoxy group and * designate an asymmetric carbon atom, or salts thereof.

10

5. An adduct salt of formula (3):



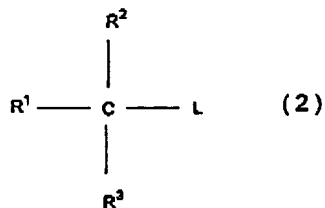
·nZ

(3)

wherein X denotes a chlorine atom, a C1-C3 alkyl group or a C1-C3 alkoxy group and * designate an asymmetric carbon atom, n represents

an integer of 1 or 2, and Z represents

an optically active acid of formula (2):



wherein L represents $-\text{COOH}$ or $-\text{SO}_3\text{H}$,

5 R^2 represents a hydrogen atom or a hydroxyl group,

R^1 and R^3 are the same or different and each independently represent

a hydrogen atom, a halogen atom, an arylcarbonyloxy group,

a liner or branched alkyl group which may be substituted with at

10 least one group selected from a hydroxyl group, a halogen atom, an arylcarbonyloxy group, a carboxy group and an arylaminocarbonyl group;

an aryl group which may be substituted with at least one group selected from a halogen atom, an alkyl group and an alkoxy group;

15 an aralkyl group which may be substituted with at least one group selected from a halogen atom, an alkyl group, an alkoxy group and a hydroxyl group;

an aryloxy group which may be substituted with at least one group selected from a halogen atom, an alkyl group, an alkoxy group and a hydroxyl group;

20 a cyclic alkyloxy group which may be substituted with at least one group selected from a halogen atom, an alkyl group, an alkoxy group and a hydroxyl group; or

a cyclic alkyl group which may be substituted with at least one group selected from a halogen atom, an alkyl group, an alkoxy group, a hydroxyl group and a phenylcarbonylamino group; or

25 R^1 and R^3 may be bonded together to form

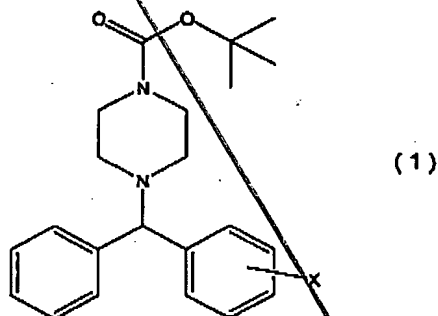
an alkylene group which may be substituted with at least one group selected from a halogen atom, an alkyl group, an alkoxy group, a carboxyl group, an oxo group, a hydroxyl group, and a phenylcarbonylamino group, or

a heterocycle which may be substituted with at least one group selected from an alkyl group, alkoxy or a halogen atom.

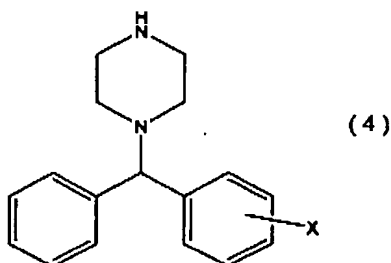
6. An adduct salt according to claim 5, wherein the acid of formula (2) is optically active O,O'-dibenzoyltartaric acid.

7. An adduct salt according to any one of claims 1, 2, 3, 4, 5, or 6, wherein X represents a chlorine atom at 4-position of the phenyl group.

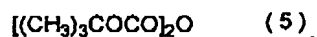
8. A process for producing a 4-(tert-butoxycarbonyl)piperazine compound of formula (1):



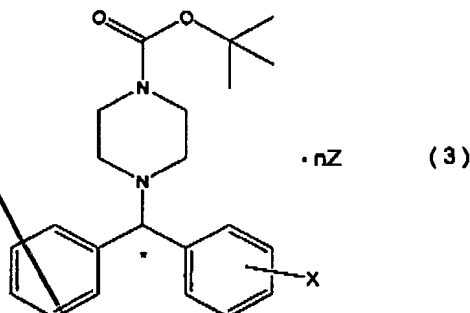
15 wherein X denotes a chlorine atom, a C1-C3 alkyl group or a C1-C3 alkoxy group, which comprises reacting 1-[(substituted phenyl)phenylmethyl]piperazine of formula (4):



20 wherein X has the same meaning as defined above, with di-tert-butyl dicarbonate of formula (5):

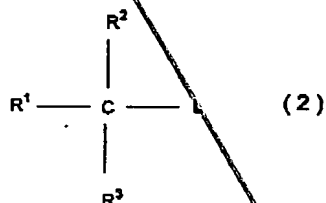


9. A process for producing an optically active adduct salt of formula (3):



5 wherein X denotes a chlorine atom, a C1-C3 alkyl group or a C1-C3 alkoxy group, * represents an asymmetric carbon atom, and n represents an integer of 1 or 2, and

Z represents an optically active acid of formula (2):



10 wherein L represents $-COOH$ or $-SO_3H$,

R^2 represents a hydrogen atom or a hydroxyl group;

R^1 and R^3 are the same or different and independently represent a hydrogen atom, a halogen atom, or an arylcarbonyloxy group;

a liner or branched alkyl group which may be substituted with at

15 least one group selected from a hydroxyl group, a halogen atom, an arylcarbonyloxy group, a carboxy group and an arylaminocarbonyl group;

an aryl group which may be substituted with at least one group selected from a halogen atom, an alkyl group and an alkoxy group;

20 an aralkyl group which may be substituted with at least one group selected from a halogen atom, an alkyl group, an alkoxy group and a hydroxyl group;

Q²
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an aryloxy group which may be substituted with at least one group selected from a halogen atom, an alkyl group, an alkoxy group and a hydroxyl group;

5 a cyclic alkyloxy group which may be substituted with at least one group selected from a halogen atom, an alkyl group, an alkoxy group and a hydroxyl group; or

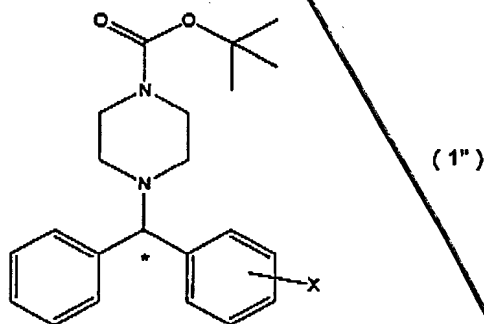
a cyclic alkyl group which may be substituted with at least one group selected from a halogen atom, an alkyl group, an alkoxy group, a hydroxyl group and a phenylcarbonylamino group; or

10 R¹ and R³ may be bonded together to form

an alkylene group which may be substituted with at least one group selected from a halogen atom, an alkyl group, an alkoxy group, a carboxyl group, an oxo group, a hydroxyl group, and a phenylcarbonylamino group, or

15 a heterocycle which may be substituted with at least one group selected from an alkyl group, an alkoxy group and a halogen atom,

which comprises reacting a composition comprising an optical isomer of 4-(tert-butoxycarbonyl)piperazine compound of formula (1''):



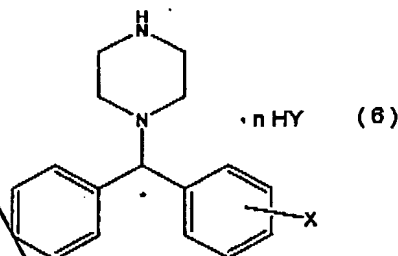
20 wherein X and * designate the same as defined above, and an enantiomer thereof, with an optically active acid of formula (2) as defined above.

10. A process according to claim 9, which further comprises recrystallizing the acid adduct salt of the optically active

4-(tert-butoxycarbonyl)piperazine of formula (3).

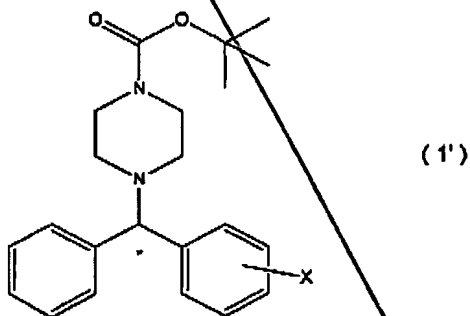
11. A process according to claim 9 or 10, which further comprises reacting an adduct salt of formula (3), with a base to produce an optically active 4-(tert-butoxycarbonyl)piperazine of formula (1').

5 12. A process for producing an adduct salt of formula (6):



wherein X denotes a chlorine atom, a C1-C3 alkyl group or a C1-C3 alkoxy group, * represents an asymmetric carbon atom, and n represents an integer of 1 or 2,

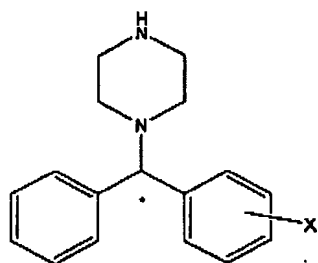
10 Y represents a halogen atom, $-\text{OSO}_3\text{H}$, $-\text{OSO}_2\text{CH}_3$, $-\text{OCOCF}_3$, $-\text{OCOCH}_3$ and $-\text{COOH}$, which comprises reacting an optically active 4-(tert-butoxycarbonyl)piperazine of formula (1'):



15 wherein X and * designate the same as defined above, with an acid of formula: HY, wherein Y represents the same as defined above.

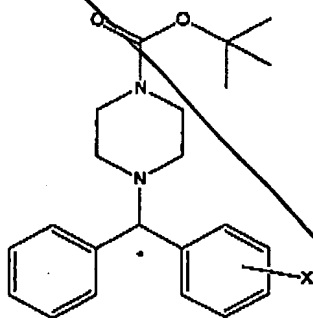
13. A process for producing an optically active 1-[(substituted phenyl)phenylmethyl]piperazine of formula (7):

a²
cont



(7)

wherein X and * each have the same meaning as defined above, which process comprises reacting an optically active 4-(tert-butoxycarbonyl)piperazine compound of formula (1'):



(1')

wherein X denotes a chlorine atom, a C1-C3 alkyl group or a C1-C3 alkoxy group, * represents an asymmetric carbon atom, with an acid and subsequently with a base.